

# MOLLUSCAN FAUNA OF POINT CALIMERE WILDLIFE SANCTUARY PART 1: GASTROPODA<sup>1</sup>

DEEPAK APTE<sup>2</sup>

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Studies were conducted in Point Calimere, located on the Coromandel coast in the Thanjavur district of Tamil Nadu. Point Calimere has diverse habitats, including sandy shores, mangroves and salt pans. Large numbers of molluscs are dragged out by fishing nets, and killed in thousands. *Volva sowerbyana*, *Tudicla spiralis*, *Strombus plicatus sibbaldi* and *Conus milne-edwardsi* were recorded for the first time from this area. *C. milne-edwardsi* was recorded after 80 years along the Indian coast, from which there is only one published record, in Mumbai in 1912.

**Key words:** Point Calimere, Gastropoda, Mollusca

## INTRODUCTION

The Indian coastline is rich in molluscan diversity. Some literature is available on this diversity, notable among which are the works of Crichton (1941), Gravely (1941, 1942), Subrahmanyam *et al.* (1952), Kundu (1965a, b), Subba Rao (1971, 1977, 1980), Rajgopal and Mukherjee (1978, 1982), Mookherjee (1985), Subba Rao *et al.* (1984, 1986, 1993) and Apte (1993). The only comprehensive work on the molluscan fauna of the southeastern coast of India is by Satyamurthi (1952, 1956). However, recent work on these molluscs was found to be inadequate. To update the status of molluscan diversity, several surveys were conducted on the southeast coast of India from 1990-1999. The present paper is part of this survey.

## STUDY AREA

Point Calimere is located on the Coromandel coast in the Thanjavur district of Tamil Nadu (10° 18' N, 79° 51' E). It is bordered by the Bay of Bengal on the east and Palk Strait on the south. Point Calimere is represented by sandy shores, mangroves and salt pans. Mudflats are also seen near the old lighthouse. Tidal action is very high; thus shells with delicate sculpture are virtually absent, or the sculpture is eroded or absent.

**Duration:** The survey was conducted during December 18-28, 1998 and December 22-28, 1999. The present paper does not report the entire gastropod fauna of Point Calimere, but only the dominant species.

**Threats:** Large numbers of molluscs are dragged by fishing nets, and get killed in thousands. The important species dragged are *Turritella acutangula*, *T. attenuata*, *Phalium areola*, *Murex trapa*, *M. badius*, *Rapana bulbosa*, *Hemifusus pugilinus*, *Oliva oliva*, *O. gibbosa*, *Xancus rapa*,

*Bursa spinosa*, *Tonna dolium*, *T. fasciata*, *Ficus variegata* and *F. fecoides*. Of these, *Xancus rapa* is sold in shops and the others are crushed to produce shell grit. Besides gastropods, several species of bivalves are also dragged out, the important ones being *Pecten tranquebaricus*, *Placenta placenta*, *Pinctada vulgaris*, *Pinna atropurpurea*, *P. bicolor* and *P. vexillum*.

**New records:** Some interesting records are marked with an asterisk (\*). Two specimens of *Volva sowerbyana* were collected from sand bars close to the jetty. This is probably the first report of this species on the southeastern coast of India. Point Calimere is a new site for *Tudicla spiralis* (several individuals, both live and dead), *Strombus plicatus sibbaldi* (one specimen) and *Conus milne-edwardsi* (one specimen).

### Family: Calyptraeidae

#### *Calyptreaa extinctorium* Lamarck

**Description:** Shell fragile, conical with pointed apex, shell surface smooth. Internal folded appendage conspicuous and attached to the internal wall of the shell. **Colour:** Whitish or dull brown marked with reddish lines. **Status:** Common.

### *Crepidula walshi* Herrmannsen

**Description:** Shell flat, elongate-ovate. Upper surface with concentric striae. **Colour:** White. **Status:** Common.

### Family: Trochidae

#### *Umbonium vestiariuum* (Linn.)

**Description:** Small shell with smooth and highly glossy surface. Body whorl broad, angular. Spires depressed. Umbilicus filled with thick callus. Aperture ovate. **Colour:** Exhibits wide range of colour variation. Usually pale yellowish-brown with numerous white, red, brown trans-spiral lines. **Status:** Common.

*Trochus radiatus* Gmelin

**Description:** Smaller than *T. stellatus*. More conical in shape. Surface sculptured by spiral rows of tubercles. Upper row of tubercles on each whorl larger than others. Columella smooth, without denticles. **Colour:** Yellowish-white ground colour with broad trans-spiral reddish/crimson bands, which usually get broken into irregular spots on basal portion of body whorl. **Status:** Common.

*Trochus stellatus* Gmelin

**Description:** Shells large, heavy and top-shaped. Surface highly granulated. Lips serrated. Sides of the shells slightly arched, giving a somewhat rounded external appearance. Tubercles on the lowest spire of each whorl enlarged compared to *T. radiatus*. Columella denticulate. **Colour:** Dull green to brown with broad radial reddish bands. **Status:** Common.

## Family: Turbinidae

*Liotia cidaris* (Reeve)

**Description:** Very small in size with low spires. Entire surface strongly ribbed. Body whorl with strong nodules. Mouth ovate. Umbilicus partly filled with white callus. **Colour:** White with brown nodules. **Status:** Uncommon.

*Turbo intercostalis* Menke

**Description:** Shell thick and large with stout spiral ridges on the surface. Trans-spiral grooves prominent on ridges, umbilicus open. **Colour:** Greenish-brown with irregular yellow patches. **Status:** Uncommon.

*Astraea semicostata* (Kiener)

**Description:** Shell resembles *Trochus*. Base flat with fewer, but sharply elevated spires. Each whorl at the base bears a spiral row of spinous processes. Trans-spiral ribs on each whorl weakly developed. Finely and concentrically grooved base. Umbilicus filled by callus. **Colour:** Beached specimens usually white, fresh specimens dull brown to yellow brown. **Status:** Common.

*Phasiauella uivosa* Reeve

**Description:** Shells smooth, glossy, shape similar to that of *Littorina*. **Colour:** Brownish-red with coloured spiral lines. A prominent single row of dark brown spots on each whorl. **Status:** Rare.

## Family: Neritidae

*Nerita albicilla* Linn.

**Description:** Large shell compared to *Nerita oryzarum*. Spires flat, depressed below extremity of outer lip. Columellar

region tuberculated. Body whorl finely ribbed. Outer lip abnormally thickened. **Colour:** Variable, but commonly whitish, irregularly blotched with greenish-black. **Status:** Common. Edible.

## Family: Architectonidae

*Architectonica laevigata* (Lamarck)

**Description:** Shell moderately large and more elevated than other species in this family. Surface finely grooved. Basal surface bears a raised outer marginal band, which is traversed by a single median spiral groove. **Colour:** Light purple/pink with a row of brown dots along the spiral ridges. **Status:** Common.

*Torinia dorsuosa* (Hinds)

**Description:** Shell resembles *Umboonium*. Shell flat with convexly arched upper surface. Granular spiral ribs. Lowermost spiral rib on each whorl strongest. Umbilicus circular with toothed margin. **Colour:** Pale brown. **Status:** Common.

## Family: Cypraeidae

*Volva sowerbyana* Weinkauff\*

**Description:** Shell ventricose with both ends prolonged into canals. Lip margins thickened. Teeth absent. **Colour:** Flesh pink. Beached specimens bleached white. **Status:** Common.

## Family: Strombidae

*Lambis lambis* (Linn.)

**Description:** Shell very large and heavy with thick callus zone. Outer lip bears 7 finger-like channelled processes. Anterior canal long and pointed. Shell covered by horny periostracum. Shoulder angular and strongly nodulated near suture. **Colour:** Chestnut to cream yellow with brown markings. Callus and inner part smooth and white or cream in colour. **Status:** Common.

*Strombus plicatus siboldi* Sowerby\*

**Description:** Among the smaller species. Spires very tall and slender on large body whorl. Each spire with two strong vertical ribs, with many fine riblets. Both lips strongly serrated on inner margin. **Colour:** White with brown mottling. Aperture white with light brown transverse striae. **Status:** Rare.

## Family: Tonnidae

*Tonua fasciata* Bruguiere

**Description:** Large shell. Body whorl ovately inflated with short conical spire. Sutures sunk in impressed grooves. Numerous broad and flattened spiral ribs present on entire surface. Columella slightly twisted. Umbilicus greatly reduced.

**Colour:** White with 4 broad, widely separated, brownish-yellow bands. **Status:** Common.

***Tonna dolium* Linn.**

**Description:** Moderately large Tun with thin and globular body whorl. Spires flat and conical. Surface bears strong spiral ribs. Fine riblets also present between main ribs. Columella obliquely striated. **Colour:** White ground colour with alternately arranged white spots on main ribs. **Status:** Abundant.

**Family: Ficidae**

***Ficus ficoides* (Lamarck)**

**Description:** Moderately large Tun with thin and fragile body whorl. Spires flat and conical. Surface spirally sculptured by strong ribs. **Colour:** Light brown with dark brown markings. **Status:** Common.

***Ficus variegata* Roding**

**Description:** Moderately large, fragile and delicate shell. Body whorl very large with slightly elevated spires. Shell surface finely serrated. **Colour:** Light brown with dark brown and reddish mottling. **Status:** Common.

**Family: Cassidae**

***Phalium areola* (Lamarck)**

**Description:** Moderately large shell. Spires sharply pointed. Well-developed varices present, one on each whorl. Body whorl with blunt, smooth, angular shoulder. Suture slightly impressed. Aperture moderately wide. Canal short and curved dorsally. Outer lip on inner margin strongly toothed. **Colour:** Creamy white with 4-5 spiral rows of large squarish dark brown or deep orange spots. **Status:** Common.

***Phalium glaucum* (Linn.)**

**Description:** Shell large, with strongly inflated body whorl. Spires short and conical. Body whorl smooth and glossy. Whorls with strong, angular shoulders beset with a row of sharply pointed tubercles. Outer lip thickened and highly denticulate on inner margin. **Colour:** Creamy white with light brown mottling. Interior of aperture dark brown. **Status:** Common.

***Phalium canaliculatum* (Bruguiere)**

**Description:** A small, fragile shell. Surface bears strong, regular spiral ridges. Suture sunk in deep, broad grooves. Columellar lip strongly plicate. Upper end of columellar lip with a few transverse ridges. Outer lip thickened and toothed within. **Colour:** White with yellowish-brown spots. **Status:** common.

**Family: Bursidae**

***Bursa granularis* Roding**

**Description:** Similar in appearance to *Bursa tuberculata*. Outer surface spirally tuberculated. Surface also with two pair of varices on each side. Posterior canal well-defined. Outer lip with strong teeth. Columella strongly folded. **Colour:** Dark reddish-brown with red brown tubercles. **Status:** Common.

***Bursa spinosa* (Lamarck)**

**Description:** Moderately large shell. Varices tuberculated. Body whorl bears fine, close set, spiral ribs which have a granular surface. Shell dorsoventrally compressed. Each whorl bears two varices, one on each side, forming a continuous ridge. These varices with strong, well-developed spines. Outer lip on inner margin strongly toothed, giving a frilled appearance. **Colour:** Pale brown, with some darker brown markings. **Status:** Common.

***Bursa margaritula* (Deshayes)**

**Description:** Shell small, broader in proportion to height. Varices strongly developed and traversed by granular surface. Columella with strong folds. Posterior canal deflected to right. **Colour:** Dark yellow brown with red brown tubercles. **Status:** Common.

**Family: Cymatiidae**

***Cymatium cingulatum* (Lamarck)**

**Description:** Shell moderately large with conical, elevated spire. Anterior canal strongly twisted. Surface with strong spiral ribs. Outer lip on inner side toothed. **Colour:** Pale yellow brown. **Status:** Common.

***Cymatium rhinoceros* (Lamarck)**

**Description:** Shell large, thick and heavy. Surface with thick and raised varices, of which two on body whorl are very prominent. Whorls angularly shouldered. **Colour:** Yellowish-brown with varices bearing orange patches. **Status:** Common.

**Family: Naticidae**

***Natica maculosa* Lamarck**

**Description:** Moderately larger than *N. picta* with slightly elevated spires. **Colour:** Pale brown with faint brown or yellow trans-spiral lines. Dots less compactly arranged. **Status:** Common.

***Natica traillii* Reeve**

**Description:** Shell small and globular. Umbilicus deep. **Colour:** Whitish with reddish-brown, irregular trans-spiral lines. **Status:** Common.

*Natica lineata* Lamareck

**Description:** Shell moderately large, globular, with inflated body whorl. Apex sharply pointed. Surface smooth and glossy. The most elegantly shaped shell among moon snails. Columella with callosity. **Colour:** Shell ashy white with close set, trans-spiral yellow or orange wavy lines. Upper few whorls pale blue or violet. **Status:** Common.

*Natica didyma* (Roding)

**Description:** Moderately large shell. Surface with fine trans-spiral striae. Body whorl very large with small or almost flat spires. Columellar border thickly callused and divided by transverse groove. **Colour:** Pale brown with callus and interior of the aperture both dark brown. **Status:** Common.

*Natica rufa* (Born)

**Description:** Shell large, thick and solid. Columella covered with thick callus. Aperture semicircular. **Colour:** Dull brown with one or two broad, brown spiral bands. **Status:** Common.

*Polynices mamilla* (Linn.)

**Description:** A moderately large shell. Surface smooth and glossy. Spires reduced, with large ovoid and elongated body whorl. Aperture obliquely inclined. Umbilicus completely filled by white callus. **Colour:** Pure white. **Status:** Common.

*Ennaticina papilla* (Gmelin)

**Description:** Shell small with inflated body whorl. Spires moderately elevated. Surface with fine spiral grooves. Aperture large, ovate and narrow posteriorly. **Colour:** white with brownish periostracum. **Status:** Common.

*Sinnum neritoideum* (Linn.)

**Description:** Shell ovoid with inflated body whorl. Spires greatly reduced. Shell surface spirally and trans-spirally grooved. Aperture large, ovate. Umbilicus open. **Colour:** White to yellow brown. **Status:** Common.

*Sinnum cnvierianum* (Recluz)

**Description:** Shell ovoid with inflated body whorl. Spires almost flat. Shell surface spirally and trans-spirally grooved. Aperture large, ovate. Shell about two and a half times as broad as tall. **Colour:** White to yellow brown. **Status:** Common.

*Sinnum delessertii* (Recluz)

**Description:** Shell ovoid, flatter than the two previous species. Spires greatly reduced, less eccentric. Shell about three times as broad as tall. Shell surface spirally and trans-

spirally grooved. Aperture large, ovate. Umbilicus open. **Colour:** White to yellow brown. **Status:** Common.

## Family: Pyramidellidae

*Pyramidella terebellum* (Muller)

**Description:** Shell small, fragile and tall, conical. Shell surface spirally grooved, grooves fine and visible only under magnification. Aperture ovate. **Colour:** Each whorl of spire with three brown spiral lines. Two spiral lines very dark. **Status:** Uncommon.

*Turbonilla crichtoni* Winckworth

**Description:** Shell small, with tall spires. Shell surface ribbed, ribs broader than interstices. **Colour:** Light brown to pink. **Status:** Uncommon.

*Odostomia babylonica* Winckworth

**Description:** Shell small, fragile with moderately tall spires. Shell surface smooth. Aperture obovate. Sutures deeply incised. **Colour:** White. **Status:** Uncommon.

## Family: Eulimidae

*Eulima bivittata* (Hinds and A. Adams)

**Description:** Shell very small, slender, with tall spires. Shell surface smooth. Aperture three times as high as broad. **Colour:** Shell light brown, with two dark brown bands on each whorl. Area between these bands pale brown. **Status:** Uncommon.

## Family: Potamididae

*Cerithidea fluviatilis* (Potiez and Michaud)

**Description:** Shell moderately large with tall spires. Whorls strongly tuberculated. Each whorl with four spiral ridges, of which lowermost is reduced. **Colour:** Light to dark brown. **Status:** Abundant.

## Family: Cerithiidae

*Cerithium morns* Lamareck

**Description:** Small ovate shell. Anterior canal deeply excavated. Body whorl with about 6-7 spiral rows of tubercles. Other whorls with three rows each. Outer lip finely ribbed on inner margin. Aperture D-shaped. A small fold present near posterior end. **Colour:** Dark greenish-grey with black tubercles. **Status:** Common.

*Cerithium obeliscus* Bruguiere

**Description:** Moderately large shell, slightly turreted in shape compared to other species. Surface sculptured with spiral rows of tubercles. Uppermost whorl strongest. Interstices between these spiral rows traversed by fine lattice

of spiral and trans-spiral ribs. Anterior canal deeply excavated and produced in a curved spout. **Colour:** Pale brown with white markings. Irregular brown blotches also present. **Status:** Common.

***Cerithium splendens* Sowerby**

**Description:** Shells small with sharply produced anterior canal. Whorls with nodular spiral ridges. **Colour:** Pale brown with alternately arranged white and brown tubercles. **Status:** Common.

**Family: Triphoridae**

***Triphora concinna* Hinds**

**Description:** Shells very small and can be collected from shell sand. Shell elongated with small body whorl. Shell surface with three rows of spirally arranged tubercles. Body whorl with five rows of tubercles. **Colour:** Pale brown with dark brown band at base of each whorl. **Status:** Common.

***Triphora violacea* (Quoy and Gaimard)**

**Description:** Shells very small, can be collected from shell sand. Shell sinistral, shell sculpture almost same as that of *T. concinna*. **Colour:** Light violet with dark violet base. **Status:** Common.

**Family: Janthinidae**

***Janthina roseola* Reeve**

**Description:** Shell small, fragile, elongated. Basal surface flattened, with angular and small body whorl. Shell surface finely striated, with three rows of spirally arranged tubercles. Body whorl with five rows of tubercles. **Colour:** Pale brown with dark brown band at base of each whorl. **Status:** Common.

**Family: Rissoidae**

***Rissoina clathrata* A. Adams**

**Description:** Shell small, with many whorls. All except body whorl with three spiral ridges. Shell surface looks granular due to crossing of spiral and trans-spiral ridges. Outer lip thick, extended anteriorly. **Colour:** Pale brown. **Status:** Common.

**Family: Mitridae**

***Mitra circula* Kiener**

**Description:** Moderately large, thick shell, with tall spires. Surface spirally ridged. Two or three trans-spiral grooves and 13 to 15 strong spiral ridges on body whorl prominent. Upper whorls of spire with 3 spiral ridges each. Columella plated, 3-4 plates can be seen. **Colour:** Yellowish-brown. **Status:** Uncommon.

**Family: Turritellidae**

***Turritella acutangula* Linn.**

**Description:** Shell tall and thick. Whorls marked with spiral ridges, of which two are prominent. Callus polished, white. **Colour:** Yellowish-brown. **Status:** Common.

***Turritella attenuata* Reeve**

**Description:** Shell slender compared to *T. acutangula* and much taller. Spiral ridges prominent on each whorl, but more in number than in *T. acutangula*. Middle rib the strongest. **Colour:** Bluish-brown. **Status:** Common.

**Family: Epitoniidae**

***Epitonium scalaris* (Linn.)**

**Description:** Very small. Whorls are encircled by trans-spiral crests. Height of shell less than twice its breadth. Aperture D-shaped, its posterior edge touching one crest of the whorl above. **Colour:** White. **Status:** Uncommon.

***Eglisia tricarinata* Adam and Reeve**

**Description:** Very small and resembles juveniles of *Turritella duplicata*. Each whorl on lower half with three distinct spiral ridges. Spires tall and sharply elevated. **Colour:** Whitish with pale brown patches. **Status:** Common.

**Family: Muricidae**

***Murex badius* Reeve**

**Description:** Shell small, with spindle shaped body. Shell surface with seven varices. Spires well-developed. Anterior canal curved and short. **Colour:** Ashy brown, periostracum light brown. **Status:** Common.

***Murex trapa* Roding**

**Description:** Shell large, elongated. Anterior canal open, very long. Spires turreted. Outer lip with three strong spines. Whorls angularly shouldered. Surface spirally ridged with three strong varices. Each varix with strong spines. **Colour:** Fresh specimens dull brown to yellowish-brown. **Status:** Common.

***Murex hanstellum* Linn.**

**Description:** Moderately large, thick but light shell. Varices prominent on each whorl. Entire surface with strong nodules. Inner margin of outer lip with strong folds. Long siphonal canal. Blunt spines on surface. **Colour:** Light pink ground colour with dark brown nodules. Inner margin of mouth light pink. **Status:** Uncommon.

***Murex virginicus* (Roding)**

**Description:** Shell large, thick, solid. Surface spirally

ridged, with three varices ornamented by short processes. Anterior canal short, partially closed. **Colour:** Pale brown with pink aperture. **Status:** Common.

***Murex adustus* Lamarck**

**Description:** Shell moderately large, thick, rough. Varices with thick set of foliaceous processes. Surface with strong, widely spaced spiral ridges. Abundant oyster growth seen on many individuals. **Colour:** Black with bluish-white aperture. **Status:** Common.

***Chicorinus ramosus* Linn.**

**Description:** Large, thick, heavy shell. Varices prominent on each whorl. Spires moderately large, elevated. Long anterior canal. Outer lip margin with well-developed, frilled spines. Largest Indo-Pacific Murex. **Colour:** White with pinkish aperture. **Status:** Common.

***Rapana bulbosa* (Dillwyn)**

**Description:** Large, thick, heavy, globose shell. Spires low, grooved. Surface finely striated with weakly developed or blunt spines. Siphonal canal very short. **Colour:** Chestnut. **Status:** Common.

***Drupa heptagonalis* (Reeve)**

**Description:** Shell small and robust, with broad trans-spiral ribs. Spiral ridges uniform. Outer lip with sharp, strong, elongated teeth. **Colour:** Pale brown with dark brown spiral bands. Columella and aperture light violet. **Status:** Common.

***Drupa margaritcola* (Broderip)**

**Description:** Shell small, spindle shaped. Surface with fine spiral ridges. Trans-spiral ribs prominent and single shouldered. **Colour:** Pale brown with dark brown spiral ridges. Aperture light purple. **Status:** Common.

***Drupa tuberculata* (Blainville)**

**Description:** Shell small, broadly ovate. Prominent, uniformly and spirally arranged stout tubercles. Outer lip with strong nodules. **Colour:** Brown with dark brown tubercles. Teeth white. **Status:** Common.

***Thais rudolphi* (Lamarck)**

**Description:** Smaller species than *T. bufo*. Thick, heavy, solid shell. Body whorl with a few strong, spirally arranged ribs. Numerous riblets also present between main ribs. Columella broad and enamelled. Outer lip finely serrated. **Colour:** Dark brown with alternate black and white spots arranged on spiral ribs. Columella brown. **Status:** Common.

***Thais bufo* (Lamarck)**

**Description:** Large, thick, heavy and solid shell. Body whorl with blunt spines. Aperture large, canaliculated on both sides. Columella broad, smooth, extending beyond upper extremity of outer lip. **Colour:** Light brown. Outer lip margin alternately marked by white and brown spots. **Status:** Common.

***Thais rugosa* (Born)**

**Description:** Large, thick, heavy and solid shell. Species resembles *Thais caranifera* in appearance. Body whorl with blunt spines; first process on body whorl well-developed compared to *Thais caranifera*. **Colour:** Light brown. Outer lip margin alternately marked by white and brown spots. **Status:** Common.

***Thais tissoti* (Petit)**

**Description:** Small, thick, stout shell. Many tubercles present on entire surface due to crossing of spiral and trans-spiral ribs. **Colour:** White with brown nodules. **Status:** Common.

***Thais intermedia* (Kiener)**

**Description:** Shells moderately large, solid. Surface rough with large, widely spaced processes in four rows, of which upper one is largest. Processes appear like pointed tubercles. Aperture wide, ovate. Outer lip with strong teeth. **Colour:** Whitish with dark brown tubercles. Aperture light blue, tinged with brown markings. **Status:** Common.

***Jopas sertum* (Bruguere)**

**Description:** Moderately large. Surface traversed by very fine spiral grooves. Shell spindle-shaped with short spires. Columella and outer lip with a single tooth at posterior end. **Colour:** Pale yellow brown with irregular dark brown and white markings. Aperture light yellow. **Status:** Uncommon.

***Maculotrion serrialis* (Laborde)**

**Description:** Shell very small, spindle-shaped. Spires tall with 5-7 whorls. Surface with strong spiral and trans-spiral ridges. Crossing of these ridges gives strong nodular appearance to the surface. Outer lip prominent and having a strong tooth. **Colour:** Pale yellow to white with dark brown or orange bands. **Status:** Uncommon.

**Family: Conidae**

***Conus anadis* Gmelin**

**Description:** Moderately large, thin and fragile shell. Surface smooth, glossy but sometimes spirally grooved. Spires sharply elevated at the last few whorls. Apex pointed. Body whorl sharply angular above. **Colour:** Dark brown/

orange with irregularly scattered whitish triangular spots. Two prominent spiral bands of densely packed brown to orange lines on body whorl. **Status:** Common.

***Conus piperatus* Dillwyn**

**Description:** Small shell. Spires moderately tall, basal portion threaded. Body whorl distinctly angular above. Aperture narrow. Whorls of spire slightly raised into ridge-like thickening above suture. Trans-spiral plates as indicators of growth lines are prominent. **Colour:** Yellowish-brown with a prominent spiral white band across middle body whorl. Raised spiral striae marked with rows of brown spots. **Status:** Common.

***Conus ebraeus* Linn.**

**Description:** Small, thick, stout shell. Spires moderately tall. Surface with raised spiral striae. Upper part of body whorl obtuse angled. **Colour:** White ground colour with four rows of black squarish spots on body whorl. A spiral row of prominent black squarish spots on rest of whorls. **Status:** Common.

***Conus nussatella* Linn.**

**Description:** Large, thin, fragile, cylindrical, and tall conical shell. Spires short but acuminate. Body whorl with a rounded receding shoulder. Surface with fine spiral granular ridges. Operculum small, horny with apical nucleus. **Colour:** Creamy brown or yellow with white brown blotches. Fine reddish-brown dots and vertical dashes arranged in vertical and horizontal rows. **Status:** Common.

***Conus araneosus* Hwass**

**Description:** Large, thick and heavy cone. Spires moderately elevated. Body whorl straight sided and broadly conical. Whorls concavely depressed. Body whorl sharply angular at upper end. Basal portion strongly threaded. Spires coronated, beset with raised tubercles. Trans-spiral plates prominent. **Colour:** White ground colour with brown mottling on entire surface. Fine brown irregularly scattered lines forming longitudinal bands. Body whorl with two prominent spiral bands of interrupted brown mottling. Aperture violet. **Status:** Common.

***Conus milne-edwardsi* Jousseaume**

**Description:** Large, elegant and fragile shell. Shell is very tall with elevated spires. Fine spiral grooves can be seen on spires on close examination. A prominent deep cleft at the posterior end of the aperture. Aperture narrow and slightly broadened at the lower end. Lip thin with sharp, cutting edge. Body whorl bear very fine trans-spiral striations. **Colour:** One

of the most brilliantly coloured cones. Base colour creamish brown with white triangular spots. The tip of these spots is directed away from aperture. Spire bears dark brown wavy markings. Two prominent spiral bands on body whorl are diagnostic. **Status:** Endangered.

**Family: Terebridae**

***Duplicaria duplicata* (Linn.)**

**Description:** Shell small, tall and slender. Surface with numerous trans-spiral ribs separated by spiral grooves and fine spiral ridges. Trans-spiral ribs prominent, single-shouldered. **Colour:** Pale brown with dark brown markings. Pale yellow spiral band clearly visible above each suture. **Status:** Common.

**Family: Turridae**

***Surcula javana* (Linn.)**

**Description:** Moderately large shell with tall, conical spires. Shoulders angular. A nodulated spiral ridge prominent at centre of each whorl. Entire surface sculptured with spiral and trans-spiral ribs that are prominent on body whorl. Crossing of these ribs gives a nodular appearance to the surface. **Colour:** Deep brown. **Status:** Common.

***Surcula amicta* Smith**

**Description:** Small shell with raised spires and pointed apex. Surface smooth, glossy. Turrid notch weakly developed. Canal short, wide. **Colour:** Creamy white with brown wavy markings. **Status:** Common.

**Family: Buccinidae**

***Babylonia spirata* (Linn.)**

**Description:** Moderately large, thick and heavy shell. Body whorl large, with a few deeply grooved spires. Whorls inflated. Surface sunk in broad grooves. Columella smooth, well-developed. Umbilicus filled with callus. Aperture large, constricted posteriorly by a thick ridge extending inwards on columellar side. Anterior canal represented by a notch. **Colour:** White ground with regular spiral row of large squarish orange spots. Fresh specimens always covered with brown periostracum. **Status:** Common. Edible.

***Cantharus undosus* (Linn.)**

**Description:** Small, spindle-shaped shell. Surface traversed by well-developed, strong, close set spiral ribs. Outer lip margin thickened and strongly denticulate. Fasciole absent. Thick brown periostracum covering the shell. Anterior canal open, inclined. Columellar border concavely excavated. **Colour:** White with reddish-brown spiral ribs. **Status:** Common.

**Family: Fasciariidae*****Fasciolaria trapezium* (Linn.)**

**Description:** Shell very large and heavy. Whorls strongly shouldered. Shoulders with strong tubercles. Columella with a few folds. Aperture spirally striated. **Colour:** Pale yellow brown, marked with dark brown paired lines. **Status:** Uncommon.

***Fusinus longicauda* (Bory)**

**Description:** Large, spindle-shaped shell with tall spires. Shell resembles *F. colus*, a species from Sri Lanka. Siphonal canal very long and open. Spiral ridges well-developed on entire surface, of which the middle one on each whorl is stronger and raised. These ribs become increasingly oblique towards canal. Last few whorls with well-developed trans-spiral ribs. Sutures sunk. Shoulders with weakly developed nodules. **Colour:** Pure white. **Status:** Common.

***Fusinus toreuma* (Lamarck)**

**Description:** Shell large, thick, solid and spindle-shaped. Surface with thick spiral ridges. Angular shoulders on each whorl bearing large tubercles. Anterior canal stout and long. **Colour:** Whitish with dark brown markings. Aperture white. **Status:** Common.

**Family: Volutidae*****Harpulina lapponica* Linn.**

**Description:** Large, thick ovoid shell. Spires short, conical. Body whorl elongated, inflated. Columella having 6-7 strong folds. Spires weakly grooved. Surface smooth. Last few whorls with prominent trans-spiral ribs. **Colour:** Cream white or pale yellowish ground colour with dark brown, indistinct mottling on surface. **Status:** Uncommon.

***Cymbium melo* (Solander)**

**Description:** Shell very large, thin, fragile with enlarged, inflated body whorl. Spires completely reduced in adults. Surface with trans-spiral grooves. Aperture very wide. **Colour:** Bright yellowish-orange with dark brown patches on body whorl. **Status:** Uncommon.

**Family: Olividae*****Oliva gibbosa* (Born)**

**Description:** Stout, thick, glossy shell. Body whorl elongate-ovoid, inflated, with two strong spiral cords at the base. Callus well-developed with close-set ridges. Spire short with pointed apex and depressed lower part. **Colour:** Light yellowish-brown with deep olive green mottling. **Status:** Common.

***Oliva nebulosa* Lamarck**

**Description:** Small shell with glossy surface. More slender and elongated than *O. gibbosa*, with less inflated body whorl. Columellar margin with folds which are more numerous than in *O. gibbosa*. **Colour:** Pale bluish-grey or whitish, mottled with greenish-blue markings. Pale brown oblique spiral bands with thick, darker brown markings at the base of body whorl. **Status:** Common.

***Ancilla ampla* (Gmelin)**

**Description:** Small, smooth with glossy surface. Spire small, with large body whorl. Aperture large but narrow. **Colour:** Whitish, tinted with bright orange brown. **Status:** Uncommon.

***Ancilla cinnamomea* (Lamarck)**

**Description:** Shell stouter and shorter than *A. ampla*. Body whorl strongly inflated with two oblique spiral grooves at base. **Colour:** Polished dark brown or coffee brown. **Status:** Uncommon.

***Ancilla acuminata* (Sowerby)**

**Description:** Similar to *A. cinnamomea* but has raised spire and more pointed apex. Base of body whorl narrower than *A. cinnamomea*. **Colour:** Pale brown with darker shade below two oblique spiral grooves on body whorl. **Status:** Rare.

***Ancilla scaphella* (Sowerby)**

**Description:** A smaller species than *Ancilla acuminata*. Spire small with blunt apex. Body whorl relatively enlarged, equally wide at both ends. Aperture very wide. **Colour:** Whitish with brown suture. **Status:** Uncommon.

**Family: Nassariidae*****Bullia melanoides* (Deshayes)**

**Description:** Shell small, with glossy surface and tall spires. Shell surface with trans-spiral ridges and fine spiral grooves. 4-5 spiral grooves present at base of body whorl. **Colour:** Dark grey with purple tinge. **Status:** Common.

***Nassarins jacksoniana* (Quoy and Gaimard)**

**Description:** Shell small with strong raised trans-spiral ridges. Outer lip thickened at edge, with tooth inside. Base of body whorl with 2-4 impressed lines. **Colour:** Olive green with white trans-spiral ribs. **Status:** Abundant.

***Nassarins hepatica* (Montagu)**

**Description:** Larger than *N. jacksoniana*. Spires well-elevated. Strong trans-spiral ribs present on entire surface. A single spiral groove cuts trans-spiral ridges below suture,



forming nodular sculpture. **Colour:** Olive green to light brown. Aperture marked with two white bands on black background. **Status:** Uncommon.

***Nassarius costata* Adams**

**Description:** Similar to *N. hepatica*. Spires comparatively well-elevated. Trans-spiral ribs finer, close-set. **Colour:** Pale grey with dark brown spiral bands. Aperture marked with brown bands on white background. **Status:** Common.

***Nassarius thersites* (Bruguiere)**

**Description:** Shell small with short spires. Body whorl large, inflated. Callus flat on columella, extends and conceals entire body whorl. Part adjoining columellar border traversed by trans-spiral ribs. Margin of outer lip reflected, thickened and toothed within. **Colour:** Ashy green with a dark central spot on body whorl. Callus white. **Status:** Common.

***Nassarius suturalis* (Lamarck)**

**Description:** Comparatively larger than *N. thersites*. Surface sculptured by fine, orange spiral lines. Columella with a strong tooth. Outer lip on inner side with strong tooth. **Colour:** Whitish with orange spiral lines. **Status:** Uncommon.

***Nassarius pallidula* Adams**

**Description:** A smaller species with elevated, pointed spire. Surface traversed by fine spiral grooves. Callus present on columella, which also bears a single strong tooth. Outer lip thickened. **Colour:** Yellowish-brown. **Status:** Uncommon.

**Family: Vasiidae (= Turbinellidae)**

***Xaucus rapa* (Lamarck)**

**Description:** Shell large, solid, heavy, pear-shaped. Always covered with brown periostracum. Spire well-elevated. Shoulder ridge with strong, blunt tubercles. Columella with four strong folds. **Colour:** Ivory white. Young specimens with dark brown spots. **Status:** Abundant.

***Tudicla spirillus* (Linn.)\***

**Description:** Moderately large in size. Apex thick, rounded with depressed spires. Spires with blunt tubercles. Body whorl broad, inflated, angled with a long, curved siphonal canal. Callus well-developed. Protoconch clearly visible. **Colour:** Light yellowish-brown with white and brown spots. Tubercles are dark brown. **Status:** Rare. This species is endemic to southeast India.

**Family: Volemidae**

***Hemifusus pugilinus* (Born)**

**Description:** Massive shell with well-elevated spires. Basal portion with coarse, close set spiral ridges. Whorls having angular shoulder with strong tubercles. Operculum thick, ovate, horny, anterior canal with broad opening. **Colour:** Pale brown covered with thick periostracum. **Status:** Common.

***Hemifusus cochlidium* (Linn.)**

**Description:** Whorls strongly and angularly shouldered. Shoulder with strong tubercles, which are fewer and more widely separated than in *H. pugilinus*. Spiral ridges prominent, except on body whorl. Sutures sunk in deep, narrow grooves. Aperture elongated and rectangular. Anterior canal wider than in *H. pugilinus* near base. **Colour:** Dark reddish-brown. Columella pale yellow brown. Periostracum brown. **Status:** Common.

**Family: Harpidae**

***Harpa conoidalis* Lamarck**

**Description:** Large, thick but fragile shell. Surface with strong, widely spaced trans-spiral ribs. Interspaces between ribs traversed by fine trans-spiral striae. Columella smooth and polished. **Colour:** Pale fleshy brown, marked with transverse brown lines. Columella with chestnut coloured blotches. Interior of aperture smoky brown. **Status:** Common.

**Family: Pilidae**

***Pila dolioides* (Reeve)**

**Description:** Moderately large, fragile shell with large body whorl. Spires more or less flat. Body whorl globular. **Colour:** Light purple. **Status:** Common.

**Family: Marginellidae**

***Marginella angustata* Sowerby**

**Description:** Shell small, smooth, ovoid. Spires completely enveloped within body whorl. Outer lip thickened and smooth within. Columella with 4 strong folds. **Colour:** Bluish white ground colour with greenish-brown spiral bands. Fine white prominent trans-spiral lines. **Status:** Common.

**Family: Bullidae**

***Bulla ampulla* Linn.**

**Description:** Moderately large, thick, globose, fragile shell. Expanded body whorl. Lip extended posteriorly beyond apex, slightly constricted centrally and expanded anteriorly. Columella reverse S-shaped, smooth with thin callus. **Colour:** Cream with dark purple brown blotches, clouded with dark brown. **Status:** Common.

**Family: Hydatinidae*****Hydatina velum* (Gmelin)**

**Description:** Moderately large, thin, fragile and elegant shell. Spires flat. Suture deeply sunk in groove. Aperture wide.

Surface with fine growth lines. Lip thin. Columella with thin callus. **Colour:** Waxy white. Four broad spiral bands of brown. Central band edged on each side with unbroken, dark brown lines. **Status:** Uncommon.

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